To: Myers, Craig[Myers.Craig@epa.gov]
Cc: Wall, Dan[wall.dan@epa.gov]; Hermann, Karl[Hermann.Karl@epa.gov]; Pierce, Maggie[Pierce.Maggie@epa.gov]; Laidlaw, Tina[Laidlaw.Tina@epa.gov]; McComb, Martin[McComb.Martin@epa.gov]
From: Spence, Sandra
Sent: Tue 8/18/2015 11:43:55 PM
Subject: Cement Creek/Animas Color

Hi Craig,

Dan and I have spent a good portion of the day discussing and considering causes of the green color you are seeing in the upper Animas/Cement creek. I suspected that you may be seeing a shifting of valence states and iron chemistries in the system causing changes in color. Generally, the reduced form of iron (Fe+2 as a sulfate) is bluish/green chalky in solution. Aluminum forms a white precipitate that can appear chalky. Also, copper can form sulfates/carbonates that appear bright blue/green. So, these metals could be involved. I looked at the iron data collected in Cement Creek and Animas at two sites (I need to look at more and will do that tomorrow). However, it appears that there are fluctuations occurring between dissolved (likely reduced) iron and particulate (likely oxidized) iron and there are times when the dissolved iron (blue/green in color) is significantly greater than the particulate iron (orange in color). So, I believe it is quite feasible that the color you are seeing is a result of iron/metals chemistry. More data analysis will occur tomorrow. The sample/analysis we have planned will measure the oxidation state of iron; so, we can speak more directly to this when we can get samples collected and data back.

We considered the possibility of a tracer study occurring in the watershed that is creating the color. So, we've included a sample/analysis for fluorescein in our request. To determine if the color is due to an algae bloom, we plan to measure chlorophyll a, which is a direct algal indicator, as well as nutrient levels. So, that's all I have for you right now.

Note the photo below and caption below it. This photo and caption are from a document entitled, "Easter Pennsylvania Coalition for Abandoned Mine Reclamation." Maybe the color will look familiar to you – it's due to iron/aluminum.

Hope all is well and feel free to call me on my cell if you need more information,

-Sandie

Sandra Spence

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An algal bloom in a pond? Nope. The Excelsior Strip Pit discharge to the Shamokin Creek not far from Shamokin, PA. It changes
green to a reddish orange, depending on the condition of the mine pool and how much oxygen is available to change the color of
aluminum. Just recently the SCRA (http://www.shamokincreek.org/) installed a weir to measure the flow.